REMARKS/ARGUMENT

The title of the invention has been changed in accordance with the Examiner's suggestion.

The specification has been amended to correct minor errors.

Claim 8 has been amended to address the rejection under 35 U.S.C. §112. It is respectfully submitted that this change does nothing more than state in different words what would have been clear to one skilled in the art with the original language and, accordingly, it is respectfully submitted that this amendment was not made for purposes related to compliance with statutory requirements of patentability.

Reconsideration of the application in view of the foregoing amendments and the following remarks is respectfully requested.

Claim 18 stand rejected under 35 U.S.C. §102(b) as being anticipated by MacDonald, et al. (U.S. Patent No. 5,362,940). Applicants respectfully traverse this rejection.

Applicants' invention, as reflected in claim 18, is directed to a method for machining a component to form a plurality of holes in the component, comprising passing a laser beam through a diffraction grating to split the beam into plural laser beams; and simultaneously forming a plurality of holes within a desired area of the component by irradiating the plural laser beams onto the component.

MacDonald, et al., in contrast, uses a Fresnel Zone Plate array (FZP) which is different than Applicants' diffraction grating in a number of respects.

A diffraction grating uses a large number of parallel closely space slits which provides a plurality of output light beams by Fraunhoffer diffraction.

An FZP is a plurality of alternating concentric light and dark rings which acts to focus light based upon Fresnel diffraction.

Thus, Applicants' invention, as reflected in claim 18, differs from MacDonald, et al. by the use of a diffraction grating, as opposed to an FZP.

Further, not only does MacDonald, et al. not use a diffraction grating, but MacDonald, et al. teaches away from the use of such a diffraction grating, see for example, column 1, lines 37 to 47.

In view of the foregoing, it is respectfully submitted that MacDonald, et al. neither anticipates nor renders Applicants' invention obvious, as defined in claim 18.

Claims 1-4, 9-10, 15 and 18 stand rejected under 35 U.S.C. §102(e) as being anticipated by Yamamoto, et al. (U.S. Patent No. 6,172,330). Applicants respectfully traverse this rejection.

Each of independent claims 1 and 18 specifies the use of a diffraction grating to split an incident laser beam into a plurality of laser beams.

Yamamoto, et al., in contrast, neither discloses nor suggests the use of a diffraction grating.

The Examiner refers to the element 15 as being a diffraction grating, however, the element 15 is merely a mask, not a diffraction grating, which is put in contact with the ceramic sheet and has openings through which portions of the sheet may be illuminated. There is no beam splitting, as occurs by use of diffraction grating. The beam, which is incident on the ceramic sheet, is the same beam that is incident on the mask 15. It is, merely, blocked from certain areas by means of the mask 15.

In view of the foregoing, it is respectfully submitted that independent claims 1 and 18 are clearly not anticipated by Yamamoto, et al. Further, there is no suggestion in Yamamoto, et al. of using a diffraction grating rather than a mask. Accordingly, it is respectfully submitted that independent claims 1, 15 and 18 are not rendered obvious by Yamamoto, et al.

Claims 2, 3, 4, 9 and 10 are dependent from claim 1 and are, therefore, patentable over Yamamoto, et al. for the same reasons, as well as because of the combination of the features set forth in these claims with the features set forth in claim 1.

Claims 1, 4, 8 and 15-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over MacDonald, et al. in view of Anderson (U.S. Patent No. 3,770,529) Saunders (U.S. Patent No. 3,742,182) or Yamamoto, et al. Applicants respectfully traverse this rejection.

As discussed above, MacDonald, et al. neither discloses nor suggests the use of a diffraction grating. Instead, MacDonald, et al. uses a FZP.

The Examiner contends that it would have been obvious for one of ordinary skill in the art to have provided a green ceramic sheet, as taught by Anderson, Saunders or Yamamoto, et al. in the process of MacDonald, et al. While all of that may be true, the resultant method would still not teach

Applicants' invention since none of the references teaches the use of a diffraction grating rather than an FZP.

In view of the foregoing, it is respectfully submitted that claims 1, 4, 8 and 15-16 are clearly patentable over the combination of MacDonald, et al., Anderson, Saunders or Yamamoto, et al.

Claims 2-3 and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over MacDonald, et al. in view of Yamamoto, et al. Applicants respectfully traverse this rejection.

As discussed above, neither MacDonald, et al. nor Yamamoto, et al. disclose or suggest the use of a diffraction grating. Accordingly, it is respectfully submitted that claims 2-3 and 10, each of which is dependent from claim 1, are patentable over the combination of MacDonald, et al. and Yamamoto, et al. for this reason, as well as because of the combination of the other features set forth in claim 1 and the features set forth in claims 2-3 and 10.

Claim 17 stands rejected under 35 U.S.C. §103(a) as being unpatentable over MacDonald, et al. in view of Yamamoto, et al. and further in view of JP 02-766173 B2[1]. Applicants respectfully traverse this rejection.

Claim 17 is directed to a method for machining a ceramic green sheet for forming a plurality of feedthrough holes on the ceramic green sheet one face of which is supported with a carrier film, comprising passing a pulse laser beam emitted from a laser source through a diffraction grating to split the beam into plural laser beams having such an energy that allows each of the plural laser beams to penetrate through the ceramic green sheet but not to penetrate through the carrier film; and forming a plurality of feedthrough holes on the ceramic green sheet by irradiating the plural laser beams on one face of the ceramic green sheet that is not supported with the carrier film.

As discussed above, neither MacDonald, et al. nor Yamamoto, et al. teach the use of a diffraction grating. Instead, MacDonald, et al. uses an FZP and Yamamoto, et al. uses a mask.

In view of the foregoing, it is that respectfully submitted that claim 17 is patentable over the combination of MacDonald, et al., Yamamoto, et al. and JP 02-766173 B2, nor does the combination

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[1] Applicants question whether the correct citation of the Japanese patent document should be JP 07-193375, as stated on the face of the patent and as stated in the PTO-892 Form, or the number cited in the Office Action of JP 02-766173 B2.

of MacDonald, et al., Yamamoto, et al. and JP 02-766173 B2 disclose the use of a diffraction grating.

Claim 17 also stands rejected under 35 U.S.C. §103(a) as being unpatentable over Yamamoto, et al. in view of the JP 02-766173 B2. Applicants respectfully traverse this rejection.

The Examiner acknowledges, with respect to Yamamoto, et al., that Yamamoto, et al. does not teach a laser machining process that does not drill a hole through a resin carrier film. In addition, as discussed above, Yamamoto, et al. does not disclose or suggest the use of a diffraction grating. Additionally, JP 02-766173 B2 does not teach the use of a diffraction grating. Accordingly, it is respectfully submitted that claim 17 is, therefore, patentable over the combination of Yamamoto, et al. and JP 02-766173 B2.

Claim 6 stands rejected under 35 U.S.C. §103(a) as being unpatentable over MacDonald, et al. in view of Yamamoto, et al. and further in view of Funami, et al. (U.S. Patent No. 5,055,653). Applicants respectfully traverse this rejection.

Applicants' invention, as reflected in claim 6, is directed to a method for machining a ceramic green sheet for forming a plurality of feedthrough holes on a ceramic green sheet, comprising, *inter alia*, disposing a laser source for emitting a pulse laser beam, a galvano-scan mirror for allowing the laser beam to reflect with a predetermined angle, a diffraction grating for splitting the laser beam into plural laser beams, a converging lens for individually converging the plural laser beams, and the ceramic green sheet so as to be arranged in a predetermined position.

MacDonald, et al., as discussed above, uses an FZP and neither discloses nor suggests the use of a diffraction grating. Indeed, as previously noted, MacDonald, et al. teaches away from the use of a diffraction grating. MacDonald, et al. also teaches away from the use of a converging lens. Again, see column 1, lines 37-47. Yamamoto, et al., as discussed above, does not teach or suggest the use of a diffraction grating.

With respect to Funami, et al., the Examiner contends that it would have been obvious to one of ordinary skill in the art to provide the converging lenses for individually converging a plurality of laser beams, as taught by Funami, et al. in the process of MacDonald, et al. in view of Yamamoto, et al. However, as discussed above in column 1, lines 37-47, MacDonald, et al. teaches away from the use of such an arrangement. In any event, there is no teaching or suggestion in Funami, et al. of

the use of a diffraction grating, let alone the use of a diffraction grating for use in the context of Applicants' invention.

For all the foregoing reasons, it is respectfully submitted that claim 6 is clearly patentable over the combination of MacDonald, et al., Yamamoto, et al. and Funami, et al.

Claims 5 and 7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over MacDonald, et al. in view of Yamamoto, et al. and further in view of Funami, et al. and White, Jr. (U.S. Patent No. 5,367,143). Applicants respectfully traverse this rejection.

Applicants' invention, as reflected in independent claim 5, is directed to a method of machining a ceramic green sheet for forming a method for machining a ceramic green sheet for forming a plurality of feedthrough holes on the ceramic green sheet, comprising, *inter alia*, disposing a laser source for emitting a pulse laser beam, a diffraction grating for splitting the laser beam into plural laser beams, a galvano-scan mirror for allowing the plural laser beams to reflect with a predetermined reflection angle, a converging lens for individually converging the plural laser beams reflected from the galvano-scan mirror, and the ceramic green sheet so as to be arranged in a predetermined position.

As discussed above in connection with claim 6, neither MacDonald, et al., Yamamoto, et al. nor Funami, et al. either disclose or suggest the use of a diffraction grating. Further, MacDonald, et al. specifically teaches away from the use of a converging lens with a diffraction grating.

White, Jr. also does not teach or suggest the use of a diffraction grating. Accordingly, it is respectfully submitted that independent claim 5 is clearly patentable over the combination of MacDonald, et al., Yamamoto, et al., Funami, et al. and White, Jr.

Claim 7 is dependent from claim 1 and is, therefore, patentable for the same reasons, as well as because of the combination of the features set forth in claim 7 with the features set forth in claim 5.

In view of the foregoing, this application is now believed to be in condition for allowance, which action is respectfully requested.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on May 29, 2002:

Martin Pfeffer
Name of applicant, assignee or Registered Representative

Signature

May 29, 2002
Date of Signature

Respectfully submitted,

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APPENDIX A

"CLEAN" VERSION OF EACH PARAGRAPH/SECTION/CLAIM
37 C.F.R. § 1.121(b)(ii) AND (c)(i)

SPECIFICATION:

Replacement for the paragraph beginning at page 1, line 1:

Please amend the title to read as follows:

METHOD FOR MACHINING CERAMIC GREEN SHEET

Replacement for the paragraph beginning at page 2, line 19 to page 2, line 25:

B1

While different sites on the ceramic green sheet have been machined (to form feedthrough holes) in a sequence by allowing a table holding a galvano-scan mirror and green sheet to travel in the conventional machining method using a laser beam, the machining rate is determined by oscillation frequency of the laser beam, scanning speed of the galvano-scan mirror and travel speed of the table all of which serve to restrict improved machining rate.

Replacement for the paragraph beginning at page 42, line 22 carrying over to page 43, line 8:

B2

The machining apparatus according to the fourth embodiment is constructed by the same way as used in the third embodiment, except that the diffraction grating **3** is placed between the galvano-scan mirror **4** and the converging lens **5**. The method for machining the ceramic green sheet using the machining apparatus as described above is also similar to the method used in the third embodiment. Accordingly, the explanations for the corresponding portions in the third embodiment are also applied to this embodiment, and detailed descriptions thereof are omitted. The portions in FIG. [14] 3 given the same reference numerals as in FIG. 1 denote the same as or corresponding to the portions in FIG. 1.

CLAIMS (with indication of amended or new):

AMENDED

8. A method for machining a ceramic green sheet according to Claim 1, wherein the diffraction grating is made of a material which is substantially transparent to the laser beam.

APPENDIX B

VERSION WITH MARKINGS TO SHOW CHANGES MADE
37 C.F.R. § 1.121(b)(iii) AND (c)(ii)

SPECIFICATION:

Paragraph beginning at page 1, line 1 to page 1, line 1:

METHOD FOR MACHINING CERAMIC GREEN SHEET [AND APPARATUS FOR MACHINING THE SAME]

Paragraph beginning at page 2, line 19 to page 2, line 25:

While different sites on the ceramic green sheet have been machined (to form feedthrough holes) in a sequence by allowing a table holding a galvano-scan mirror and green sheet to travel in the conventional machining method using a laser beam, the machining rate is determined by oscillation frequency of the laser beam, scanning speed of the galvano-scan mirror and travel speed of the table all of which serve to restrict improved machining rate.

Paragraph beginning at page 42, line 22 carrying over to page 43, line 8:

The machining apparatus according to the fourth embodiment is constructed by the same way as used in the third embodiment, except that the diffraction grating **3** is placed between the galvano-scan mirror **4** and the converging lens **5**. The method for machining the ceramic green sheet using the machining apparatus as described above is also similar to the method used in the third embodiment. Accordingly, the explanations for the corresponding portions in the third embodiment are also applied to this embodiment, and detailed descriptions thereof are omitted. The portions in FIG. [14] 3 given the same reference numerals as in FIG. 1 denote the same as or corresponding to the portions in FIG. 1.

CLAIMS:

8. A method for machining a ceramic green sheet according to Claim 1, wherein the diffraction grating is made of a material which is substantially transparent to [having a high transmittance against] the laser beam.